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EXAMINER	
LE, LANA N	

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2618	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/784,838	JOHNSON, RICHARD A.	
	Examiner	Art Unit	
	Lana N. Le	2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 May 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,13,18-25 and 27-46* is/are rejected.

7)☒ Claim(s) *8-12, 14-17, and 26* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-2, 5, 29-30 are rejected under 35 U.S.C. 102(a) as being unpatentable over Liu et al (US 6,222,891) (hereinafter Liu) in view of Holenstein et al (hereafter Holenstein) (US 2003/0,199,264).

Regarding claims 1 and 29, Liu discloses a tuner (figs. 1, 4) comprising: a direct digital frequency synthesizer (DDFS 30, 72) having an output terminal for providing a digital local oscillator signal having a frequency chosen to mix a channel to a desired frequency; and a mixer (18, 50) having a first input terminal for receiving a IF frequency signal, a second input terminal (input into mixer from 30, 72) coupled to the output terminal of the direct digital frequency synthesizer (72), and an output terminal (output of mixer) for providing an output digital signal at a desired frequency (col 5, lines 35-55; col 9, lines 20-49; col 11, lines 41-61).

However, Liu do not disclose the first input terminal receiving an RF frequency signal and the output terminal for providing an output analog signal. In related art, Holenstein discloses the first input terminal of mixer (direct converter 306) receiving an RF

frequency signal (input signal from RF antenna 302 to 306) and the output terminal (output terminal of direct converter 306) for providing an output analog signal (analog signal at output of 306; fig. 5; paras. 49-50). It would have been obvious to one of ordinary skill in the art at the time the invention was made to input an RF signal as received by the antenna into an RF converter and output an analog signal instead of a digital signal in order to obtain and remove coarse static DC offset levels as suggested by Holenstein (para. 49).

Regarding claims 2 and 30, Liu and Holenstein disclose the tuner of claim 1, wherein Holenstein discloses the desired frequency of the output signal is at baseband (para. 50; via direct conversion).

Regarding claim 5, Liu and Holenstein disclose the tuner of claim 1, wherein Holenstein discloses the radio frequency represents a radio band signal (radio frequency at 302).

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu and Holenstein in view of the admitted prior art.

Regarding claim 6, Liu, Holenstein disclose the tuner and method of tuning of claims 27 and 45 respectively, wherein they do not specifically disclose the radio band signal is an FM radio signal. The admitted prior art discloses an FM radio signal input to the mixer (paras. 3, 6). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have an FM signal for diversity reception of the radio signals of interest.

5. Claims 3 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu and Holenstein in view of Cowley (US 2002/0,177,423).

Regarding claims 3 and 31, Liu and Holenstein disclose the tuner and method of tuning of claims 1 and 29 respectively, wherein they do not disclose the radio frequency signal (Rs) comprises a plurality of channels and wherein the desired frequency of the output signal is less than or equal to three channel widths. Cowley discloses the radio frequency signal comprises a plurality of channels and wherein the desired frequency of the output signal is less than or equal to three channel widths (para. 31). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the desired frequency be less than or equal to three channel widths in order to provide a low intermediate frequency signal to align the tuner onto a desired channel centered on a low intermediate frequency as suggested by Cowley.

6. Claims 4 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Liu and Holenstein in view of Birleson et al (US 6,177,964).

Regarding claims 4 and 32, Liu and Holenstein disclose the tuner and method of tuning of claims 1 and 29 respectively, wherein they do not specifically disclose the radio frequency signal comprises a plurality of channels and wherein the desired frequency of the output signal is greater than three channel widths. However, it is notoriously old and well known in the art to have the desired frequency be greater than three channel widths as in high or regular intermediate frequencies as taught by Bireleson et al (col 8, lines 10-12). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the frequency be

greater than three channel widths in order to convert the received RF signal to an appropriate intermediate frequency.

7. Claims 18, 20, 38, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu and Holenstein in view of Sakamoto (US 4,361,906) and further in view of Oosawa et al (US 2005/0,239,499).

Regarding claims 18 and 38, Liu and Holenstein disclose the tuner and method of tuning of claim 7 and 33 respectively, wherein Liu and Holenstein do not disclose the tuner comprises at least an additional receive path comprising: a second direct digital frequency synthesizer having an output terminal for providing a digital local oscillator signal having a frequency chosen to mix a channel to a desired frequency; and a second mixer having a first input terminal for receiving a radio frequency signal, a second input terminal coupled to the output terminal of the second direct digital frequency synthesizer, and an output terminal for providing a second output signal at a desired frequency. Sakamoto discloses a tuner comprises at least the additional receive path (56, 29, 48,49-54, 31) comprising: a second direct digital frequency synthesizer (second PLL synthesizer; col 2, lines 45-58) having an output terminal for providing a digital local oscillator signal having a frequency chosen to mix a channel to a desired frequency; and a second mixer (48) having a first input terminal for receiving a radio frequency signal (WsubRF), a second input terminal coupled to the output terminal of the second direct digital frequency synthesizer, and an output terminal for providing a second output signal at a desired frequency. Although Sakamoto do not disclose the second synthesizer is digital, it is well known and notoriously old in the art to have the

synthesizer of Sakamoto digital as well in order to output digital oscillator signals in a complex domain. The admitted prior art and Sakamoto do not disclose one additional receive path on the single integrated circuit. Oosawa disclose one additional receive path on the single integrated circuit (para. 18; fig. 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to integrate the additional receive path in order to utilize a light and small multi band receiver with most of its functional components combined in an integrated circuit.

Regarding claims 20 and 40, Liu and Holenstein, Sakamoto and Oosawa disclose the tuner and method of tuning of claims 18 and 38 respectively, wherein Sakamoto discloses the first mixer (137, 143) and the second mixer receive a radio frequency signal in different frequency bands (col 9, lines 56-68).

8. Claims 19 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu and Holenstein in view of Sakamoto (US 4,361,906) and further in view of Oosawa et al (US 2005/0,239,499) and further in view of Yano et al (US 6,711,149).

Regarding claims 19 and 39, Liu and Holenstein, Sakamoto and Oosawa disclose the tuner and method of tuning of claims 18 and 38 respectively, wherein the admitted prior art, Sakamoto and Oosawa do not disclose the first mixer and the second mixer receive a radio frequency signal within the same frequency band. Yano et al disclose the two receivers receive a radio frequency signal within the same frequency band (col 11, lines 22-29). It would have been obvious to one of ordinary skill in the art at the time the invention was made to receive within the same band in order to allow the receiver to receive simultaneously from two different remote stations as suggested by Yano et al.

9. Claims 21, 25 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu and Holenstein in view of Sakamoto (US 4,361,906).

Regarding claims 21 and 41, Liu and Holenstein disclose the tuner and method of tuning of claims 7 and 33 respectively, wherein Liu and Holenstein do not disclose the radio frequency signal represents a television signal. Sakamoto et al disclose the RF signal represents a television signal (col 1, lines 40-43). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the tuner of the admitted prior art tune a television signal in order to tune to a desired TV channel for the user.

Regarding claim 25, the admitted prior art discloses the tuner of claim 7, wherein the admitted prior art does not specifically disclose the tuner comprising an oscillator having a clock signal as an output, the mixer being configured to receive the clock signal and the direct digital frequency synthesizer being configured to receive the clock signal through a divider. Sakamoto discloses a phase locked loop comprising an oscillator (25) having a clock signal as an output, a mixer (48) being configured to receive the clock signal and the direct digital frequency synthesizer (18-22, 30-31) being configured to receive the clock signal through a divider (26). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a clock signal in order to phase compare to lock the local clock source to the received timing information.

10. Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu and Holenstein in view of Sakamoto (US 4,361,906) and further in view of Hedstrom (WO 97/06604).

Regarding claim 42, Liu, Holenstein, and Sakamoto disclose the tuner of claim 41, where they do not disclose the method where the desired frequency of the output signal is at baseband and further comprising converting the output signal from baseband to a predetermined center frequency utilizing a second digital local oscillator signal. Hedstrom discloses a method wherein the desired frequency of the output signal is at baseband (via 54, 58) and further comprising converting the output signal from baseband to a predetermined center frequency (via 132, 134) utilizing a second digital local oscillator signal. It would have been obvious to one of ordinary skill in the art at the time the invention was made to convert the output of the first and second mixers to a predetermined frequency in order to provide further conversion to a desired frequency to detect a stronger signal.

11. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu and Holenstein in view of Hedstrom (WO 97/06604).

Regarding claim 23, Liu and Holenstein disclose the tuner of claim 22, where they do not disclose the tuner comprising a converter circuit configured to convert the output signals from the first and second mixers to a predetermined center frequency. Hedstrom discloses a converter circuit (132, 134) configured to convert the output signals from the first and second mixers (54, 58) to a predetermined center frequency. It would have been obvious to one of ordinary skill in the art at the time the invention

was made to convert the output of the first and second mixers to a predetermined frequency in order to provide further conversion to a desired frequency to detect a stronger signal.

12. Claims 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu and Holenstein in view of Staszewski et al (US 2003/0,083,033).

Regarding claim 34, Liu and Holenstein disclose the method of claim 29, wherein Liu and Holenstein do not disclose the mixing step comprises converting the radio frequency signal to at least one current signal; and mixing the at least one current signal with the output from the direct digital frequency synthesizer. Staszewski et al disclose a method for converting the radio frequency signal to at least one current signal and mixing the at least one current signal with the output from the direct digital frequency synthesizer. (para. 52, 101; figs. 11a, 14). It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the mixer of Stone et al with the mixer of Staszewski et al in order to reduce power consumption by generating clock signals that can be shared by the different signal paths.

Regarding claim 35, Liu, Holenstein and Staszewski et al disclose the method of claim 34, wherein Staszewski disclose the radio frequency signal, the current signal, and the output signal comprise differential signals (para. 73; figs. 11a, 14).

Regarding claim 36, Liu, Holenstein and Staszewski et al disclose the method of claim 34, wherein Staszewski et al disclose the converting step comprises generating a plurality of current signals using a plurality of transconductor cells (para. 101; fig. 14).

13. Claims 13, 22 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu and Holenstein in view of Stone et al (5,251,218).

Regarding claims 13 and 37, Liu and Holenstein discloses the tuner and method of tuning of claim 1 and 29 respectively, wherein Liu and Holenstein does not disclose the direct digital frequency synthesizer further comprises an input terminal for receiving a tuning signal corresponding to a desired channel and is configured to provide the digital local oscillator signal at a frequency determined at least in part by the tuning signal. Stone et al disclose the direct digital frequency synthesizer (111) further comprises an input terminal for receiving a tuning signal (control input) corresponding to a desired channel and is configured to provide the digital local oscillator signal (cos, sin outputs) at a frequency determined at least in part by the tuning signal (col 5, lines 32-41). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the synthesizer of Liu and Holenstein have an input signal in order to provide a signal indicative of a selected channel to be tuned as suggested Stone et al.

Regarding claim 22, Liu and Holenstein discloses the tuner of claim 21, wherein Liu and Holenstein do not disclose the tuner further comprising a second mixer having a first input terminal for receiving the radio frequency signal, a second input terminal, and an output terminal for providing a quadrature signal, wherein the direct digital frequency synthesizer further has a second output terminal coupled to the second input terminal of the second mixer for providing for providing a phase-shifted digital local oscillator signal. Stone et al disclose a second mixer (121) having a first input terminal for receiving the

radio frequency signal (Rs), a second input terminal (input terminal to receive signal from 111), and an output terminal for providing a quadrature signal (Q), wherein the direct digital frequency synthesizer (111) further has a second output terminal coupled to the second input terminal of the second mixer (121) for providing for providing a phase-shifted digital local oscillator signal (sin LO output) (figs. 1 & 3). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a second mixer coupled to the synthesizer in order to downconvert the RF signal to a complex domain baseband signal as suggested by Stone et al.

14. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu and Holenstein (US 5,251,218) in view of Hedstrom (WO 97/06604) and further in view of Birleson et al (US 6,177,964).

Regarding claim 24, Liu and Holenstein and Hedstrom disclose the tuner of claim 23, wherein they do not disclose the tuner further comprising a second direct digital frequency synthesizer having an output coupled to the converter circuit. Birleson et al disclose a second direct digital frequency synthesizer (32) having an output coupled to the converter circuit (204). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a second synthesizer in order to separately control the local oscillator inputs.

15. Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu and Holenstein in view of Tomasz et al (US 2001/0,041,532) and further in view of Sakamoto (US 4,361,906).

Regarding claim 43, Liu, Holenstein, Tomasz et al disclose the method of claim 33, wherein they do not disclose the method further comprising providing a reference clock signal and utilizing the reference clock signal in the generating and mixing steps. Sakamoto disclose the method comprising providing a reference clock signal (from reference oscillator 25) and utilizing the reference clock signal in the generating and mixing steps (col 2, lines 45-58). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a reference clock signal in order to phase compare to lock the local clock source to the received timing information.

16. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu and Holenstein in view of Sakamoto (US 4,361,906) and further in view of Staszewski et al (US 2003/0,083,033).

Regarding claim 44, Liu, Holenstein and Sakamoto disclose the method of claim 43, wherein they do not disclose the mixing step comprises converting the radio frequency signal to M current signals, generating an M-bit digital signal from the digital local oscillator signal, and mixing the M current signals with the M-bit digital signal to provide the output signal at the desired frequency. Staszewski et al disclose a mixing step comprises converting the radio frequency signal to M current signals, generating an M-bit digital signal from the digital local oscillator signal, and mixing the M current signals with the M-bit digital signal to provide the output signal at the desired frequency (para. 52, 101; figs. 11a, 14). It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the mixing of Liu and Holenstein with

the mixing of Staszewski et al in order to reduce power consumption by generating clock signals that can be shared by the different signal paths.

17. Claims 7, 27, 33, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu and Holenstein in view of Tomasz et al (US 2001/0,041,532).

Regarding claims 7 and 33, Liu and Holenstein disclose the tuner and method of tuning of claims 1 and 29 respectively, wherein they do not disclose the direct digital frequency synthesizer and the mixer are combined in a single integrated circuit. Tomasz et al disclose the direct digital frequency synthesizer (500) and the mixer (124, 126) are combined in a single integrated circuit (120); (fig. 7; para. 22). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the mixer and synthesizer combined in an integrated circuit in order to reduce the size of the downconverter circuit for compactness.

Regarding claims 27 and 45, Liu, Holenstein, and Tomasz et al disclose the tuner and method of tuning of claims 7 and 33 respectively, wherein Holenstein disclose radio frequency signal represents a radio band signal (RF signal at 302).

18. Claims 28 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu and Holenstein, Tomasz et al in view of the admitted prior art.

Regarding claims 28 and 46, Liu, Holenstein and Tomasz et al disclose the tuner and method of tuning of claims 27 and 45 respectively, wherein they do not specifically disclose the radio band signal is an FM radio signal. The admitted prior art discloses an FM radio signal input to the mixer (paras. 3, 6). It would have been obvious to one of

ordinary skill in the art at the time the invention was made to have an FM signal for diversity reception.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lana N. Le whose telephone number is (571) 272-7891. The examiner can normally be reached on M-F 9:30-18:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward F. Urban can be reached on (571) 272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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